Tárgytematika / Course Description

Thermo- and Hydrodynamics

GKNB_MGTA003

Tárgyfelelős neve / Teacher's name: Hadas-Rapi Ádám
Félév / Semester: 2021/22/1
Beszámolási forma / Assesment: Folyamatos számonkérés
Tárgy heti óraszáma / Teaching hours(week): 2/2/0
Tárgy féléves óraszáma / Teaching hours(sem.): 0/0/0

OKTATÁS CÉLJA / AIM OF THE COURSE

Based on the previously acquired physical and mathematical knowledge, students learn the basic theoretical principles of flow, thermodynamics and heat transfer;
practice their application, which is essential for acquiring knowledge of other subjects that build on the subject, and in later general engineering practice.

TANTÁRGY TARTALMA / DESCRIPTION

1st week

Basic laws of hydrostatics. Calculation of force from pressure in simple and complex fields. Capillarity.

2nd Week

Fundamentals of flow, conservation of flow properties (continuity equation, Bernoulli's equation and conversation of momentum) and their applications.

3rd Week

Flow of viscous fluids, features of flow in tubes and drains. Determination the energy-loss.

4th Week

The characteristics of flows around solid bodies in open spaces. Determination of drag and lift around aerofoil.

5th week

Fourier's law of heat conduction, and its application for planar- or cylindrical walls, rods and

heatsinks.

6th Week

Newton's law of heat convection. Coefficient of heat convection. Methods and formulae to determine the coefficint of heat convection. Calculation of thermal transmittance in case of planar-, cylindrical surfaces or heatsinks.

7th week

Stefan-Boltzmann law of heat radiation. Calculation the thermal energy transmitted by heat radiation. Calculations of shielding against heat radiation.

8th Week

Summary of heat transfer.

9th Week

Ideal gas law (equation of state), first law of thermodynamics. Processes of ideal gases and mixtures of gases.

10th Week

Thermodynamic cycles. Second law of thermodynamics. Definition and applications of enthropy.

11th Week

Processes of vapours. Definition of enthalpy. Property tables and charts for vapours and their handling.

12th Week

The humid air. Applying the diagram of humid air to follow its processes.

13th Week

Summary of processes and cycles of ideal and real gases or mixtures of gases

14th Week

Summary.

SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE / ASSESMENT'S METHOD

To write all the test during the semester is obligatory. The student is only entitled to write the computer test if he / she accepts the computer test rules after entering the test writing system (Moodle system exam site, available at https://exam.sze.hu). It is not possible to accept the rules from 6:00 am on the day of each test until midnight on the given day.

The trail tests last 45 minutes, each test consists of 2 practical examples to solve and 4 theoretical questions to answer.

The taril test will be avaiable on SzE-learning (szelearning.sze.hu) from the following dates until end of the semester.

- 1st trail test: 25/9/2021 (Saturday) 8:00 AM
- 2nd trail test: 23/10/2021 (Saturday) 8:00 AM
- 3rd trail test: 27/11/2021 (Saturday) 8:00 AM

The tests last 126 minutes, each test consists of 6 practical examples to solve and 12 theoretical questions to answer.

10 points can be obtained for each correct solution of examples, 2 points can be obtained for each correct answer to the questions. So 84 points can be obtained for each test at the best.

All the tests going to be written on the exam.sze.hu platform. The solutions of the examples should be written in to the appropriate text-box. The theoretical questions will be asked on the same platform, the correct answers should be selected from the options provided in the test platform.

The test and retaken test will be taken on the following date and location:

- Test: 3/12/2021 (Library)
- Retaken test: 10/12/2021 (Library)

The following grades are going to be defined:

Total points	Grade
- 41	fail (1)
42 - 58	pass (2)
59 - 67	satisfactory (3)
68 - 75	good (4)
76 -	excellent (5)

In order to succeed the semester, further two tests can be written in the exam term. You can

register in the NEPTUN system.

KÖTELEZŐ IRODALOM / OBLIGATORY MATERIAL

Obligatory reading: (avaiable at szelearning.sze.hu)

Y. NAKAYAMA - R. F. BOUCHER: Introduction to Fluid Mechanics
John H. Lienhard IV - John H. Lienhard V: A Heat Transfer Textbook
Joseph M. Powers: Lecture Notes on Thermodynamics

Recommended reading: (only in hungarian)
Dr. Író Béla - Dr. Zsenák Ferenc: Műszaki Áramlástan I. és II.
elektronikus jegyzet, BSc, Széchenyi István Egyetem
Dr. Író Béla - Dr. Zsenák Ferenc: Műszaki Hőtan
elektronikus jegyzet, BSc, Széchenyi István Egyetem

Misc
Materials needed to learn the subject can be found at the NEPTUN Meet Street and szelearning.sze.hu platform.